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Patent and Trademark Office

SEARCH REQUEST FORM

Requestor's Name: Irene Marx Serial Number: 10/076383

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Search Topic:

Please write a detailed statement of search topic. Describe specifically as possible the subject matter to be searched. Define any terms that may have a special meaning. Give examples or relevent citations, authors, keywords, etc., if known. For sequences, please attach a copy of the sequence. You may include a copy of the broadest and/or most relevent claim(s).

Please search inventors

Process of making orthoaminophenols from nitroarenes -

- using nitroreductase and mutase (cl.1)
- using Pseudomonas pseudoalcaligenes (cl.6)
- using metal catalyst and mutase (cl.8)
- nitroarenes of cl.5

(20)
4/1

STAFF USE ONLY

7/1
Date completed: 7/7
Searcher: Hanley
Terminal time: 55
Elapsed time: 60 prep
CPU time:
Total time:
Number of Searches:
Number of Databases:

Search Site
- ____ STIC
- ____ CM-1
- ____ Pre-S

Type of Search
- ____ N.A. Sequence
- ____ A.A. Sequence
- 2 Structure
- ____ Bibliographic

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- ____ Dialog
- ____ APS
- ____ Geninfo
- ____ SDC
- ____ DARC/Questel
- ____ Other

Inventor search

MARX 10/076,383

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     (FILE 'HOME' ENTERED AT 16:23:52 ON 07 JUL 2003)

     FILE 'HCAPLUS' ENTERED AT 16:24:26 ON 07 JUL 2003
L1          185 S SPAIN J?/AU
L2           31 S NADEAU L?/AU
L3         3012 S HE Z?/AU
L4         3208 S L1-3
L5           22 S L4 AND ?AMINOPHENOL
L6            6 S L5 AND MUTASE
L7            3 S L5 AND NITROREDUCTASE
L8            7 S L6-7
                 SELECT RN L8 1-7

     FILE 'REGISTRY' ENTERED AT 16:28:15 ON 07 JUL 2003
L9           23 S E1-23
                 SAVE L9 MAR383INV/A TEMP

     FILE 'HCAPLUS' ENTERED AT 16:28:32 ON 07 JUL 2003
L10           6 S L8 AND L9
L11           7 S L8 OR L10
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=> d ibib abs hitstr ind 1-7

L11 ANSWER 1 OF 7 HCAPLUS COPYRIGHT 2003 ACS
ACCESSION NUMBER: 2003:377636 HCAPLUS
TITLE: Bacterial conversion of hydroxylamino aromatic compounds by both lyase and **mutase** enzymes involves intramolecular transfer of hydroxyl groups
AUTHOR(S): **Nadeau, Lloyd J.**; **He, Zhongqi**; **Spain, Jim C.**
CORPORATE SOURCE: Air Force Research Laboratory, Tyndall Air Force Base, FL, 32403, USA
SOURCE: Applied and Environmental Microbiology (2003), 69(5), 2786-2793
CODEN: AEMIDF; ISSN: 0099-2240
PUBLISHER: American Society for Microbiology
DOCUMENT TYPE: Journal
LANGUAGE: English
AB Hydroxylamino arom. compds. are converted to either the corresponding aminophenols or protocatechuate during the bacterial degrdn. of nitroarom. compds. The origin of the hydroxyl group of the products could be the substrate itself (intramol. transfer mechanism) or the solvent water (intermol. transfer mechanism). The conversion of hydroxylaminobenzene to 2-**aminophenol** catalyzed by a **mutase** from Pseudomonas pseudoalcaligenes JS45 proceeds by an intramol. hydroxyl transfer. The conversions of hydroxylaminobenzene to 2- and 4-**aminophenol** by a **mutase** from Ralstonia eutropha JMP134 and to 4-hydroxylaminobenzoate to protocatechuate by a lyase from Comamonas acidovorans NBA-10 and Pseudomonas sp. strain 4NT were proposed, but not exptl. proved, to proceed by the intermol. transfer mechanism. GC-MS anal. of the reaction products formed in H218O did not indicate any 18O-label incorporation during the conversion of hydroxylaminobenzene to 2- and 4-aminophenols catalyzed by the **mutase** from R. eutropha JMP134. During the conversion of 4-hydroxylaminobenzoate catalyzed by the hydroxylaminolyase from Pseudomonas sp. strain 4NT, only one of the two hydroxyl groups in the product, protocatechuate, was 18O labeled. The other hydroxyl group in the product must have come from the substrate. The **mutase** in strain JS45 converted 4-hydroxylaminobenzoate to 4-amino-3-hydroxybenzoate, and the lyase in Pseudomonas strain 4NT converted hydroxylaminobenzene to aniline and 2-**aminophenol** but not to catechol. The results indicate that all three types of enzyme-catalyzed rearrangements of hydroxylamino arom. compds. proceed via intramol. transfer of hydroxyl groups.
CC 10 (Microbial, Algal, and Fungal Biochemistry)
REFERENCE COUNT: 36 THERE ARE 36 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L11 ANSWER 2 OF 7 HCAPLUS COPYRIGHT 2003 ACS
ACCESSION NUMBER: 2000:476646 HCAPLUS
DOCUMENT NUMBER: 133:219407
TITLE: Sequence analysis and initial characterization of two isozymes of hydroxylaminobenzene **mutase** from Pseudomonas pseudoalcaligenes JS45
AUTHOR(S): Davis, John K.; Paoli, George C.; **He, Zhongqi**; **Nadeau, Lloyd J.**; Somerville, Charles C.; **Spain, Jim C.**
CORPORATE SOURCE: Air Force Research Laboratory/MLQR, Tyndall Air Force Base, FL, 32403-5323, USA
SOURCE: Applied and Environmental Microbiology (2000), 66(7), 2965-2971

CODEN: AEMIDF; ISSN: 0099-2240
PUBLISHER: American Society for Microbiology
DOCUMENT TYPE: Journal
LANGUAGE: English

AB Pseudomonas pseudoalcaligenes JS45 grows on nitrobenzene by a partially reductive pathway in which the intermediate hydroxylaminobenzene is enzymically rearranged to 2-**aminophenol** by hydroxylaminobenzene **mutase** (HAB **mutase**). The properties of the enzyme, the reaction mechanism, and the evolutionary origin of the gene(s) encoding the enzyme are unknown. In this study, two open reading frames (habA and habB), each encoding an HAB **mutase** enzyme, were cloned from a P. pseudoalcaligenes JS45 genomic library and sequenced. The open reading frames encoding HabA and HabB are sepd. by 2.5 kb and are divergently transcribed. The deduced amino acid sequences of HabA and HabB are 44% identical. The HAB **mutase** specific activities in crude exts. of Escherichia coli clones synthesizing either HabA or HabB were similar to the specific activities of exts. of strain JS45 grown on nitrobenzene. HAB **mutase** activity in E. coli exts. contg. HabB withstood heating at 85.degree. for 10 min, but exts. contg. HabA were inactivated when they were heated at temps. above 60.degree.. HAB **mutase** activity in exts. of P. pseudoalcaligenes JS45 grown on nitrobenzene exhibited intermediate temp. stability. Although both the habA gene and the habB gene conferred HAB **mutase** activity when they were sep. cloned and expressed in E. coli, reverse transcriptase PCR anal. indicated that only habA is transcribed in P. pseudoalcaligenes JS45. A mutant strain derived from strain JS45 in which the habA gene was disrupted was unable to grow on nitrobenzene, which provided physiol. evidence that HabA is involved in the degrdn. of nitrobenzene. A strain in which habB was disrupted grew on nitrobenzene. Gene Rv3078 of Mycobacterium tuberculosis H37Rv encodes a protein whose deduced amino acid sequence is 52% identical to the HabB amino acid sequence. E. coli contg. M. tuberculosis gene Rv3078 cloned into pUC18 exhibited low levels of HAB **mutase** activity. Sequences that exhibit similarity to transposable element sequences are present between habA and habB, as well as downstream of habB, which suggests that horizontal gene transfer resulted in acquisition of one or both of the hab genes.

IT **291800-90-3 291800-92-5**
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(amino acid sequence; sequence anal. and initial characterization of two isoenzymes of hydroxylaminobenzene **mutase** from Pseudomonas pseudoalcaligenes JS45)

RN 291800-90-3 HCAPLUS
CN Mutase, N-hydroxybenzenamine (Pseudomonas pseudoalcaligenes strain JS45 gene habA isoenzyme) (9CI) (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

RN 291800-92-5 HCAPLUS
CN Mutase, N-hydroxybenzenamine (Pseudomonas pseudoalcaligenes strain JS45 gene habB isoenzyme) (9CI) (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

IT **291800-91-4 291800-93-6 292063-70-8**
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(amino acid sequence; sequence anal. of genes habA and habB and transposable element of Pseudomonas pseudoalcaligenes JS45 in relation to horizontal gene transfer)

RN 291800-91-4 HCAPLUS
CN Transposase (Pseudomonas pseudoalcaligenes strain JS45) (9CI) (CA INDEX

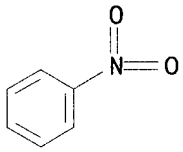
NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***
RN 291800-93-6 HCAPLUS
CN DNA-resolving enzyme (Pseudomonas pseudoalcaligenes strain JS45 transposon Tn5501 gene tnpR) (9CI) (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***
RN 292063-70-8 HCAPLUS
CN Transposase (Pseudomonas pseudoalcaligenes strain JS45 transposon Tn5501 gene tnpA N-terminal fragment) (9CI) (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***
IT **201927-07-3**, GenBank AF028594
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(nucleotide sequence; sequence anal. of genes habA and habB and transposable element of Pseudomonas pseudoalcaligenes JS45 in relation to horizontal gene transfer)
RN 201927-07-3 HCAPLUS
CN DNA (Pseudomonas pseudoalcaligenes strain JS45 gene habA plus transposase gene plus gene habB plus gene tnpR plus gene tnpA fragment plus 5'-flank) (9CI) (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***
IT **98-95-3**, Nitrobenzene, biological studies
RL: BSU (Biological study, unclassified); BIOL (Biological study)
(sequence anal. and initial characterization of two isoenzymes of hydroxylaminobenzene **mutase** from Pseudomonas pseudoalcaligenes JS45)
RN 98-95-3 HCAPLUS
CN Benzene, nitro- (8CI, 9CI) (CA INDEX NAME)



IT **261765-91-7**, Hydroxylaminobenzene **mutase**
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(sequence anal. and initial characterization of two isoenzymes of hydroxylaminobenzene **mutase** from Pseudomonas pseudoalcaligenes JS45)
RN 261765-91-7 HCAPLUS
CN Mutase, N-hydroxybenzenamine (9CI) (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***
CC 7-5 (Enzymes)
Section cross-reference(s): 3, 10
ST Pseudomonas gene habA habB hydroxylaminobenzene **mutase** isoenzyme sequence; transposable element gene transfer Pseudomonas
IT Enzymes, biological studies
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(DNA-resolving; sequence anal. of genes habA and habB and transposable element of Pseudomonas pseudoalcaligenes JS45 in relation to horizontal

gene transfer)

IT Transposons
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(Tn5501; sequence anal. of genes habA and habB and transposable element of Pseudomonas pseudoalcaligenes JS45 in relation to horizontal gene transfer)

IT Gene, microbial
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(habA; sequence anal. of genes habA and habB and transposable element of Pseudomonas pseudoalcaligenes JS45 in relation to horizontal gene transfer)

IT Gene, microbial
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(habB; sequence anal. of genes habA and habB and transposable element of Pseudomonas pseudoalcaligenes JS45 in relation to horizontal gene transfer)

IT Evolution
(mol.; sequence anal. of genes habA and habB and transposable element of Pseudomonas pseudoalcaligenes JS45 in relation to horizontal gene transfer)

IT Genetic mapping
(restriction; sequence anal. of genes habA and habB and transposable element of Pseudomonas pseudoalcaligenes JS45 in relation to horizontal gene transfer)

IT Pseudomonas pseudoalcaligenes
Thermal stability
(sequence anal. and initial characterization of two isoenzymes of hydroxylaminobenzene **mutase** from Pseudomonas pseudoalcaligenes JS45)

IT DNA sequences
Protein sequences
(sequence anal. of genes habA and habB and transposable element of Pseudomonas pseudoalcaligenes JS45 in relation to horizontal gene transfer)

IT Gene, microbial
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(tnpA; sequence anal. of genes habA and habB and transposable element of Pseudomonas pseudoalcaligenes JS45 in relation to horizontal gene transfer)

IT Gene, microbial
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(tnpR; sequence anal. of genes habA and habB and transposable element of Pseudomonas pseudoalcaligenes JS45 in relation to horizontal gene transfer)

IT Enzymes, biological studies
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(transposases; sequence anal. of genes habA and habB and transposable element of Pseudomonas pseudoalcaligenes JS45 in relation to horizontal gene transfer)

IT **291800-90-3 291800-92-5**
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(amino acid sequence; sequence anal. and initial characterization of two isoenzymes of hydroxylaminobenzene **mutase** from

Pseudomonas pseudoalcaligenes JS45)

IT **291800-91-4 291800-93-6 292063-70-8**
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(amino acid sequence; sequence anal. of genes habA and habB and transposable element of Pseudomonas pseudoalcaligenes JS45 in relation to horizontal gene transfer)

IT **201927-07-3**, GenBank AF028594
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(nucleotide sequence; sequence anal. of genes habA and habB and transposable element of Pseudomonas pseudoalcaligenes JS45 in relation to horizontal gene transfer)

IT **98-95-3**, Nitrobenzene, biological studies
RL: BSU (Biological study, unclassified); BIOL (Biological study)
(sequence anal. and initial characterization of two isoenzymes of hydroxylaminobenzene **mutase** from Pseudomonas pseudoalcaligenes JS45)

IT **261765-91-7**, Hydroxylaminobenzene **mutase**
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(sequence anal. and initial characterization of two isoenzymes of hydroxylaminobenzene **mutase** from Pseudomonas pseudoalcaligenes JS45)

REFERENCE COUNT: 42 THERE ARE 42 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

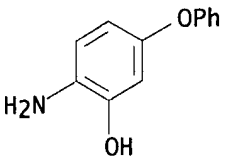
L11 ANSWER 3 OF 7 HCAPLUS COPYRIGHT 2003 ACS
ACCESSION NUMBER: 2000:349018 HCAPLUS
DOCUMENT NUMBER: 133:88272
TITLE: Production of 2-amino-5-phenoxyphenol from 4-nitrobiphenyl ether using nitrobenzene **nitroreductase** and hydroxylaminobenzene **mutase** from Pseudomonas pseudoalcaligenes JS45
AUTHOR(S): **Nadeau, L. J.; He, Z.; Spain, J. C.**
CORPORATE SOURCE: Air Force Research Laboratory/MLQ, Tyndall Air Force Base, FL, 32403, USA
SOURCE: Journal of Industrial Microbiology & Biotechnology (2000), 24(4), 301-305
CODEN: JIMBFL; ISSN: 1367-5435
PUBLISHER: Nature Publishing Group
DOCUMENT TYPE: Journal
LANGUAGE: English

AB Microbial metab. of nitroarenes via o-aminophenols requires the participation of two key enzymes, a **nitroreductase** and an hydroxylaminobenzene **mutase**. The broad substrate ranges of the enzymes suggested that they could be used as biocatalysts for the prodn. of substituted o-aminophenols. Enzymes from Pseudomonas pseudoalcaligenes JS45 were used for the conversion of 4-nitrobiphenyl ether to the corresponding o-**aminophenol**. Partially purified nitrobenzene **nitroreductase** reduced 4-nitrobiphenyl ether to the corresponding 4-hydroxylaminobiphenyl ether. Partially purified hydroxylaminobenzene **mutase** stoichiometrically converted the intermediate to 2-amino-5-phenoxyphenol. The results indicate that the enzyme system can be applied for the prodn. of o-aminophenols useful as intermediates for synthesis of com. important materials.

IT **42944-32-1P**
RL: BMF (Bioindustrial manufacture); BPN (Biosynthetic preparation); BIOL (Biological study); PREP (Preparation)

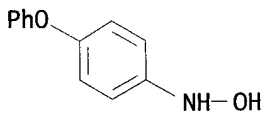
(2-amino-5-phenoxyphenol prodn. from 4-nitrobiphenyl ether using nitrobenzene **nitroreductase** and hydroxylaminobenzene **mutase** from Pseudomonas pseudoalcaligenes)

RN 42944-32-1 HCAPLUS
CN Phenol, 2-amino-5-phenoxy- (9CI) (CA INDEX NAME)



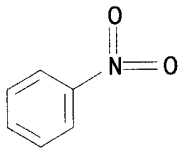
IT **39501-62-7P**
RL: BPN (Biosynthetic preparation); BPR (Biological process); BSU (Biological study, unclassified); RCT (Reactant); BIOL (Biological study); PREP (Preparation); PROC (Process); RACT (Reactant or reagent)
(2-amino-5-phenoxyphenol prodn. from 4-nitrobiphenyl ether using nitrobenzene **nitroreductase** and hydroxylaminobenzene **mutase** from Pseudomonas pseudoalcaligenes)

RN 39501-62-7 HCAPLUS
CN Benzenamine, N-hydroxy-4-phenoxy- (9CI) (CA INDEX NAME)



IT **98-95-3**, Nitrobenzene, biological studies
RL: BPR (Biological process); BSU (Biological study, unclassified); BIOL (Biological study); PROC (Process)
(2-amino-5-phenoxyphenol prodn. from 4-nitrobiphenyl ether using nitrobenzene **nitroreductase** and hydroxylaminobenzene **mutase** from Pseudomonas pseudoalcaligenes)

RN 98-95-3 HCAPLUS
CN Benzene, nitro- (8CI, 9CI) (CA INDEX NAME)



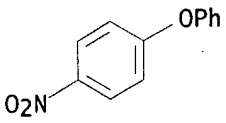
IT **9037-41-6**, Nitrobenzene **nitroreductase**
261765-91-7, Hydroxylaminobenzene **mutase**
RL: BPR (Biological process); BSU (Biological study, unclassified); CAT (Catalyst use); BIOL (Biological study); PROC (Process); USES (Uses)
(2-amino-5-phenoxyphenol prodn. from 4-nitrobiphenyl ether using nitrobenzene **nitroreductase** and hydroxylaminobenzene **mutase** from Pseudomonas pseudoalcaligenes)

RN 9037-41-6 HCAPLUS
CN Reductase, nitro- (9CI) (CA INDEX NAME)

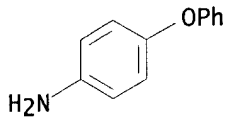
*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

RN 261765-91-7 HCAPLUS
CN Mutase, N-hydroxybenzenamine (9CI) (CA INDEX NAME)

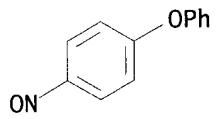
*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***
IT **620-88-2**, 4-Phenoxynitrobenzene
RL: BPR (Biological process); BSU (Biological study, unclassified); RCT (Reactant); BIOL (Biological study); PROC (Process); RACT (Reactant or reagent)
(2-amino-5-phenoxyphenol prodn. from 4-nitrobiphenyl ether using nitrobenzene **nitroreductase** and hydroxylaminobenzene **mutase** from Pseudomonas pseudoalcaligenes)
RN 620-88-2 HCAPLUS
CN Benzene, 1-nitro-4-phenoxy- (9CI) (CA INDEX NAME)



IT **139-59-3P**, 4-Phenoxy-benzenamine **52671-42-8P**, p-Phenoxynitrosobenzene
RL: BYP (Byproduct); PREP (Preparation)
(2-amino-5-phenoxyphenol prodn. from 4-nitrobiphenyl ether using nitrobenzene **nitroreductase** and hydroxylaminobenzene **mutase** from Pseudomonas pseudoalcaligenes)
RN 139-59-3 HCAPLUS
CN Benzenamine, 4-phenoxy- (9CI) (CA INDEX NAME)



RN 52671-42-8 HCAPLUS
CN Benzene, 1-nitroso-4-phenoxy- (9CI) (CA INDEX NAME)



CC 16-5 (Fermentation and Bioindustrial Chemistry)
Section cross-reference(s): 60
ST enzymic prodn aminophenoxyphenol nitrobiphenyl
IT Pseudomonas pseudoalcaligenes
(2-amino-5-phenoxyphenol prodn. from 4-nitrobiphenyl ether using nitrobenzene **nitroreductase** and hydroxylaminobenzene **mutase** from Pseudomonas pseudoalcaligenes)
IT Benzenoids
RL: BMF (Bioindustrial manufacture); BPN (Biosynthetic preparation); BPR (Biological process); BSU (Biological study, unclassified); BYP (Byproduct); RCT (Reactant); BIOL (Biological study); PREP (Preparation); PROC (Process); RACT (Reactant or reagent)
(2-amino-5-phenoxyphenol prodn. from 4-nitrobiphenyl ether using

nitrobenzene **nitroreductase** and hydroxylaminobenzene **mutase** from Pseudomonas pseudoalcaligenes)

IT Amines, preparation
RL: BMF (Bioindustrial manufacture); BPN (Biosynthetic preparation); BYP (Byproduct); BIOL (Biological study); PREP (Preparation)
(arom.; 2-amino-5-phenoxyphenol prodn. from 4-nitrobiphenyl ether using nitrobenzene **nitroreductase** and hydroxylaminobenzene **mutase** from Pseudomonas pseudoalcaligenes)

IT Nitro compounds
RL: BPR (Biological process); BSU (Biological study, unclassified); RCT (Reactant); BIOL (Biological study); PROC (Process); RACT (Reactant or reagent)
(arom.; 2-amino-5-phenoxyphenol prodn. from 4-nitrobiphenyl ether using nitrobenzene **nitroreductase** and hydroxylaminobenzene **mutase** from Pseudomonas pseudoalcaligenes)

IT Nitro compounds
RL: BPR (Biological process); BSU (Biological study, unclassified); RCT (Reactant); BIOL (Biological study); PROC (Process); RACT (Reactant or reagent)
(arom.; 2-amino-5-phenoxyphenol prodn. from 4-nitrobiphenyl ether using nitrobenzene **nitroreductase** and hydroxylaminobenzene **mutase** from Pseudomonas pseudoalcaligenes)

IT Reduction
(biol.; 2-amino-5-phenoxyphenol prodn. from 4-nitrobiphenyl ether using nitrobenzene **nitroreductase** and hydroxylaminobenzene **mutase** from Pseudomonas pseudoalcaligenes)

IT Aromatic compounds
Aromatic compounds
RL: BPR (Biological process); BSU (Biological study, unclassified); RCT (Reactant); BIOL (Biological study); PROC (Process); RACT (Reactant or reagent)
(nitro; 2-amino-5-phenoxyphenol prodn. from 4-nitrobiphenyl ether using nitrobenzene **nitroreductase** and hydroxylaminobenzene **mutase** from Pseudomonas pseudoalcaligenes)

IT **42944-32-1P**
RL: BMF (Bioindustrial manufacture); BPN (Biosynthetic preparation); BIOL (Biological study); PREP (Preparation)
(2-amino-5-phenoxyphenol prodn. from 4-nitrobiphenyl ether using nitrobenzene **nitroreductase** and hydroxylaminobenzene **mutase** from Pseudomonas pseudoalcaligenes)

IT **39501-62-7P**
RL: BPN (Biosynthetic preparation); BPR (Biological process); BSU (Biological study, unclassified); RCT (Reactant); BIOL (Biological study); PREP (Preparation); PROC (Process); RACT (Reactant or reagent)
(2-amino-5-phenoxyphenol prodn. from 4-nitrobiphenyl ether using nitrobenzene **nitroreductase** and hydroxylaminobenzene **mutase** from Pseudomonas pseudoalcaligenes)

IT **98-95-3**, Nitrobenzene, biological studies
RL: BPR (Biological process); BSU (Biological study, unclassified); BIOL (Biological study); PROC (Process)
(2-amino-5-phenoxyphenol prodn. from 4-nitrobiphenyl ether using nitrobenzene **nitroreductase** and hydroxylaminobenzene **mutase** from Pseudomonas pseudoalcaligenes)

IT **9037-41-6**, Nitrobenzene **nitroreductase**
261765-91-7, Hydroxylaminobenzene **mutase**
RL: BPR (Biological process); BSU (Biological study, unclassified); CAT (Catalyst use); BIOL (Biological study); PROC (Process); USES (Uses)
(2-amino-5-phenoxyphenol prodn. from 4-nitrobiphenyl ether using nitrobenzene **nitroreductase** and hydroxylaminobenzene **mutase** from Pseudomonas pseudoalcaligenes)

IT **620-88-2**, 4-Phenoxynitrobenzene
RL: BPR (Biological process); BSU (Biological study, unclassified); RCT (Reactant); BIOL (Biological study); PROC (Process); RACT (Reactant or reagent)
(2-amino-5-phenoxyphenol prodn. from 4-nitrobiphenyl ether using nitrobenzene **nitroreductase** and hydroxylaminobenzene **mutase** from Pseudomonas pseudoalcaligenes)
IT **139-59-3P**, 4-Phenoxy-benzenamine **52671-42-8P**, p-Phenoxynitrosobenzene
RL: BYP (Byproduct); PREP (Preparation)
(2-amino-5-phenoxyphenol prodn. from 4-nitrobiphenyl ether using nitrobenzene **nitroreductase** and hydroxylaminobenzene **mutase** from Pseudomonas pseudoalcaligenes)
REFERENCE COUNT: 34 THERE ARE 34 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L11 ANSWER 4 OF 7 HCAPLUS COPYRIGHT 2003 ACS
ACCESSION NUMBER: 2000:155056 HCAPLUS
DOCUMENT NUMBER: 132:290385
TITLE: Characterization of hydroxylaminobenzene **mutase** from pNBZ139 cloned from Pseudomonas pseudoalcaligenes JS45: a highly associated SDS-stable enzyme catalyzing an intramolecular transfer of hydroxy groups
AUTHOR(S): **He, Zhongqi; Nadeau, Lloyd J.; Spain, Jim C.**
CORPORATE SOURCE: Air Force Research Laboratory, Tyndall Air Force Base, FL, 32403, USA
SOURCE: European Journal of Biochemistry (2000), 267(4), 1110-1116
CODEN: EJBCAI; ISSN: 0014-2956
PUBLISHER: Blackwell Science Ltd.
DOCUMENT TYPE: Journal
LANGUAGE: English
AB Hydroxylaminobenzene **mutase** is the enzyme that converts intermediates formed during initial steps in the degrdn. of nitrobenzene to a novel ring-fission lower pathway in Pseudomonas pseudoalcaligenes JS45. The **mutase** catalyzes a rearrangement of hydroxylaminobenzene to 2-**aminophenol**. The mechanism of the reactions and the properties of the enzymes are unknown. In crude exts., the hydroxylaminobenzene **mutase** was stable at SDS concns. as high as 2%. A procedure including Hitrap-SP, Hitrap-Q and Cu(II)-chelating chromatog. was used to partially purify the enzyme from an Escherichia coli clone. The partially purified enzyme was eluted in the void vol. of a Superose-12 gel-filtration column even in the presence of 0.05% SDS in 25 mM Tris/HCl buffer, which indicated that it was highly assocd. When the enzymic conversion of hydroxylaminobenzene to 2-**aminophenol** was carried out in 18O-labeled water, the product did not contain 18O, as detd. by GC-MS. The results indicate that the reaction proceeded by intramol. transfer of the hydroxy group from the nitrogen to the C-2 position of the ring. The mechanism is clearly different from the intermol. transfer of the hydroxy group in the non-enzymic Bamberger rearrangement of hydroxylaminobenzene to 4-**aminophenol** and in the enzymic hydroxymutation of chorismate to isochorismate.
IT **261765-91-7P**, Hydroxylaminobenzene **mutase**
RL: BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); PRP (Properties); PUR (Purification or recovery); BIOL (Biological study); PREP (Preparation)
(recombinant; characterization of hydroxylaminobenzene **mutase**

from pNBZ139 cloned from Pseudomonas pseudoalcaligenes JS45, a highly assocd. SDS-stable enzyme catalyzing an intramol. transfer of hydroxy groups)
RN 261765-91-7 HCAPLUS
CN Mutase, N-hydroxybenzenamine (9CI) (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***
CC 7-4 (Enzymes)
ST Pseudomonas hydroxylaminobenzene **mutase** hydroxyl intramol transfer mechanism
IT Hydroxyl group
Pseudomonas pseudoalcaligenes
(characterization of hydroxylaminobenzene **mutase** from pNBZ139 cloned from Pseudomonas pseudoalcaligenes JS45, a highly assocd. SDS-stable enzyme catalyzing an intramol. transfer of hydroxy groups)
IT Rearrangement
(intramol., enzymic; characterization of hydroxylaminobenzene **mutase** from pNBZ139 cloned from Pseudomonas pseudoalcaligenes JS45, a highly assocd. SDS-stable enzyme catalyzing an intramol. transfer of hydroxy groups)
IT **261765-91-7P**, Hydroxylaminobenzene **mutase**
RL: BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); PRP (Properties); PUR (Purification or recovery); BIOL (Biological study); PREP (Preparation)
(recombinant; characterization of hydroxylaminobenzene **mutase** from pNBZ139 cloned from Pseudomonas pseudoalcaligenes JS45, a highly assocd. SDS-stable enzyme catalyzing an intramol. transfer of hydroxy groups)
REFERENCE COUNT: 36 THERE ARE 36 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

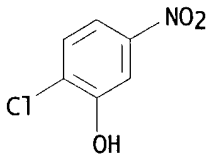
L11 ANSWER 5 OF 7 HCAPLUS COPYRIGHT 2003 ACS
ACCESSION NUMBER: 1999:369309 HCAPLUS
DOCUMENT NUMBER: 131:155650
TITLE: Chemoselective nitro group reduction and reductive dechlorination initiate degradation of 2-chloro-5-nitrophenol by Ralstonia eutropha JMP134
AUTHOR(S): Schenzle, Andreas; Lenke, Hiltrud; **Spain, Jim C.**; Knackmuss, Hans-Joachim
CORPORATE SOURCE: Fraunhofer-Institut fur Grenzflachen- und Bioverfahrenstechnik, Stuttgart, D-70569, Germany
SOURCE: Applied and Environmental Microbiology (1999), 65(6), 2317-2323
CODEN: AEMIDF; ISSN: 0099-2240
PUBLISHER: American Society for Microbiology
DOCUMENT TYPE: Journal
LANGUAGE: English
AB R. eutropha JMP134 utilizes 2-chloro-5-nitrophenol (I) as a sole source of N, C, and energy. The initial steps for degrdn. of I are analogous to those of 3-nitrophenol degrdn. in R. eutropha JMP134. I is initially reduced to 2-chloro-5-**hydroxylaminophenol**, which is subject to an enzymic Bamberger rearrangement yielding 2-amino-5-chlorohydroquinone. The Cl of 2-amino-5-chlorohydroquinone is removed by a reductive mechanism, and aminohydroquinone is formed. I and 3-nitrophenol induce the expression of 3-nitrophenol **nitroreductase**, of 3-**hydroxylaminophenol mutase**, and of the dechlorinating activity. 3-Nitrophenol **nitroreductase** catalyzes chemoselective redn. of arom. nitro groups to hydroxylamino groups in the presence of NADPH. 3-Nitrophenol **nitroreductase** is active with a variety of mono-, di-, and trinitroarom. compds., demonstrating a relaxed substrate

specificity of the enzyme. Nitrosobenzene serves as a substrate for the enzyme and is converted faster than nitrobenzene.

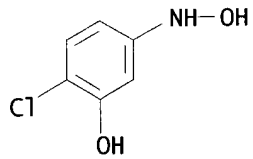
IT **9037-41-6P**, 3-Nitrophenol reductase
RL: BAC (Biological activity or effector, except adverse); BOC (Biological occurrence); BSU (Biological study, unclassified); PUR (Purification or recovery); BIOL (Biological study); OCCU (Occurrence); PREP (Preparation)
(chemoselective nitro group redn. and reductive dechlorination initiate degrdn. of 2-chloro-5-nitrophenol by Ralstonia eutropha JMP134)
RN 9037-41-6 HCAPLUS
CN Reductase, nitro- (9CI) (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***
IT **224427-05-8**, 3-**Hydroxylaminophenol mutase**
RL: BOC (Biological occurrence); BSU (Biological study, unclassified); BIOL (Biological study); OCCU (Occurrence)
(chemoselective nitro group redn. and reductive dechlorination initiate degrdn. of 2-chloro-5-nitrophenol by Ralstonia eutropha JMP134)
RN 224427-05-8 HCAPLUS
CN Mutase, 3-(hydroxylamino)phenol (9CI) (CA INDEX NAME)

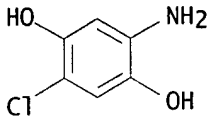
*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***
IT **619-10-3**, 2-Chloro-5-nitrophenol
RL: BPR (Biological process); BSU (Biological study, unclassified); BIOL (Biological study); PROC (Process)
(chemoselective nitro group redn. and reductive dechlorination initiate degrdn. of 2-chloro-5-nitrophenol by Ralstonia eutropha JMP134)
RN 619-10-3 HCAPLUS
CN Phenol, 2-chloro-5-nitro- (8CI, 9CI) (CA INDEX NAME)



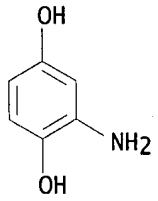
IT **225089-58-7**, Phenol, 2-Chloro-5-hydroxyamino- **237437-82-0**
RL: BPR (Biological process); BSU (Biological study, unclassified); MFM (Metabolic formation); BIOL (Biological study); FORM (Formation, nonpreparative); PROC (Process)
(chemoselective nitro group redn. and reductive dechlorination initiate degrdn. of 2-chloro-5-nitrophenol by Ralstonia eutropha JMP134)
RN 225089-58-7 HCAPLUS
CN Phenol, 2-chloro-5-(hydroxyamino)- (9CI) (CA INDEX NAME)



RN 237437-82-0 HCAPLUS
CN 1,4-Benzenediol, 2-amino-5-chloro- (9CI) (CA INDEX NAME)



IT **20734-68-3**, 2-Aminohydroquinone
RL: BSU (Biological study, unclassified); MFM (Metabolic formation); BIOL (Biological study); FORM (Formation, nonpreparative)
(chemoselective nitro group redn. and reductive dechlorination initiate degrdn. of 2-chloro-5-nitrophenol by Ralstonia eutropha JMP134)
RN 20734-68-3 HCAPLUS
CN 1,4-Benzenediol, 2-amino- (9CI) (CA INDEX NAME)



CC 10-2 (Microbial, Algal, and Fungal Biochemistry)
Section cross-reference(s): 7
ST Ralstonia chloronitrophenol nitro redn dechlorination
IT Ralstonia eutropha
(chemoselective nitro group redn. and reductive dechlorination initiate degrdn. of 2-chloro-5-nitrophenol by Ralstonia eutropha JMP134)
IT Dechlorination
(reductive; chemoselective nitro group redn. and reductive dechlorination initiate degrdn. of 2-chloro-5-nitrophenol by Ralstonia eutropha JMP134)
IT **9037-41-6P**, 3-Nitrophenol reductase
RL: BAC (Biological activity or effector, except adverse); BOC (Biological occurrence); BSU (Biological study, unclassified); PUR (Purification or recovery); BIOL (Biological study); OCCU (Occurrence); PREP (Preparation)
(chemoselective nitro group redn. and reductive dechlorination initiate degrdn. of 2-chloro-5-nitrophenol by Ralstonia eutropha JMP134)
IT **224427-05-8**, 3-**Hydroxylaminophenol mutase**
RL: BOC (Biological occurrence); BSU (Biological study, unclassified); BIOL (Biological study); OCCU (Occurrence)
(chemoselective nitro group redn. and reductive dechlorination initiate degrdn. of 2-chloro-5-nitrophenol by Ralstonia eutropha JMP134)
IT **619-10-3**, 2-Chloro-5-nitrophenol
RL: BPR (Biological process); BSU (Biological study, unclassified); BIOL (Biological study); PROC (Process)
(chemoselective nitro group redn. and reductive dechlorination initiate degrdn. of 2-chloro-5-nitrophenol by Ralstonia eutropha JMP134)
IT **225089-58-7**, Phenol, 2-Chloro-5-hydroxyamino- **237437-82-0**
RL: BPR (Biological process); BSU (Biological study, unclassified); MFM (Metabolic formation); BIOL (Biological study); FORM (Formation, nonpreparative); PROC (Process)
(chemoselective nitro group redn. and reductive dechlorination initiate degrdn. of 2-chloro-5-nitrophenol by Ralstonia eutropha JMP134)
IT **20734-68-3**, 2-Aminohydroquinone
RL: BSU (Biological study, unclassified); MFM (Metabolic formation); BIOL (Biological study); FORM (Formation, nonpreparative)
(chemoselective nitro group redn. and reductive dechlorination initiate

degrdn. of 2-chloro-5-nitrophenol by Ralstonia eutropha JMP134)
REFERENCE COUNT: 53 THERE ARE 53 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L11 ANSWER 6 OF 7 HCAPLUS COPYRIGHT 2003 ACS
ACCESSION NUMBER: 1999:171848 HCAPLUS
DOCUMENT NUMBER: 130:348959
TITLE: 3-**hydroxylaminophenol mutase** from Ralstonia eutropha JMP134 catalyzes a Bamberger rearrangement
AUTHOR(S): Schenzle, Andreas; Lenke, Hiltrud; **Spain, Jim C.**; Knackmuss, Hans-Joachim
CORPORATE SOURCE: Fraunhofer Institut fur Grenzflachen- und Bioverfahrenstechnik, Institut fur Mikrobiologie der Universitat Stuttgart, Stuttgart, D-70569, Germany
SOURCE: Journal of Bacteriology (1999), 181(5), 1444-1450
CODEN: JOBAAY; ISSN: 0021-9193
PUBLISHER: American Society for Microbiology
DOCUMENT TYPE: Journal
LANGUAGE: English

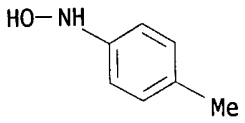
AB 3-**Hydroxylaminophenol mutase** from Ralstonia eutropha JMP134 is involved in the degradative pathway of 3-nitrophenol, in which it catalyzes the conversion of 3-**hydroxylaminophenol** to aminohydroquinone. To show that the reaction was really catalyzed by a single enzyme without the release of intermediates, the corresponding protein was purified to apparent homogeneity from an ext. of cells grown on 3-nitrophenol as the nitrogen source and succinate as the carbon and energy source. 3-**Hydroxylaminophenol mutase** appears to be a relatively hydrophobic but sol. and colorless protein consisting of a single 62-kDa polypeptide. The pI was detd. to be at pH 4.5. In a database search, the NH2-terminal amino acid sequence of the undigested protein and of two internal sequences of 3-**hydroxylaminophenol mutase** were found to be most similar to those of glutamine synthetases from different species. Hydroxylaminobenzene, 4-hydroxylaminotoluene, and 2-chloro-5-**hydroxylaminophenol**, but not 4-hydroxylaminobenzoate, can also serve as substrates for the enzyme. The enzyme requires no oxygen or added cofactors for its reaction, which suggests an enzymic mechanism analogous to the acid-catalyzed Bamberger rearrangement.

IT **224427-05-8P**, 3-(Hydroxylamino)phenol **mutase**
RL: BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); PRP (Properties); PUR (Purification or recovery); BIOL (Biological study); PREP (Preparation)
(**hydroxylaminophenol mutase** from Ralstonia eutropha JMP134 catalyzes a Bamberger rearrangement)
RN 224427-05-8 HCAPLUS
CN Mutase, 3-(hydroxylamino)phenol (9CI) (CA INDEX NAME)

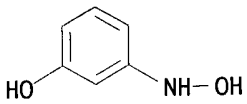
*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***
IT **100-65-2 623-10-9 10603-61-9 225089-58-7**
RL: BPR (Biological process); BSU (Biological study, unclassified); BIOL (Biological study); PROC (Process)
(**hydroxylaminophenol mutase** from Ralstonia eutropha JMP134 catalyzes a Bamberger rearrangement)
RN 100-65-2 HCAPLUS
CN Benzenamine, N-hydroxy- (9CI) (CA INDEX NAME)

HO—NH—Ph

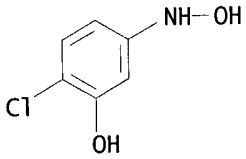
RN 623-10-9 HCAPLUS
CN Benzenamine, N-hydroxy-4-methyl- (9CI) (CA INDEX NAME)



RN 10603-61-9 HCAPLUS
CN Phenol, 3-(hydroxyamino)- (9CI) (CA INDEX NAME)



RN 225089-58-7 HCAPLUS
CN Phenol, 2-chloro-5-(hydroxyamino)- (9CI) (CA INDEX NAME)



CC 7-4 (Enzymes)
ST **hydroxylaminophenol mutase** Bamberger rearrangement
Ralstonia
IT Rearrangement
(Bamberger; **hydroxylaminophenol mutase** from
Ralstonia eutropha JMP134 catalyzes a Bamberger rearrangement)
IT Protein sequences
(N-terminal; **hydroxylaminophenol mutase** from
Ralstonia eutropha JMP134 catalyzes a Bamberger rearrangement)
IT Michaelis constant
Reaction mechanism
(**hydroxylaminophenol mutase** from Ralstonia eutropha
JMP134 catalyzes a Bamberger rearrangement)
IT **224427-05-8P**, 3-(Hydroxylamino)phenol **mutase**
RL: BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); PRP (Properties); PUR (Purification or recovery); BIOL (Biological study); PREP (Preparation)
(**hydroxylaminophenol mutase** from Ralstonia eutropha
JMP134 catalyzes a Bamberger rearrangement)
IT **100-65-2 623-10-9 10603-61-9**
225089-58-7
RL: BPR (Biological process); BSU (Biological study, unclassified); BIOL (Biological study); PROC (Process)
(**hydroxylaminophenol mutase** from Ralstonia eutropha

JMP134 catalyzes a Bamberger rearrangement)
REFERENCE COUNT: 56 THERE ARE 56 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L11 ANSWER 7 OF 7 HCAPLUS COPYRIGHT 2003 ACS
ACCESSION NUMBER: 1995:658590 HCAPLUS
DOCUMENT NUMBER: 123:105988
TITLE: Purification and characterization of nitrobenzene **nitroreductase** from Pseudomonas pseudoalcaligenes JS45
AUTHOR(S): Somerville, Charles C.; Nishino, Shirley F.; **Spain, Jim C.**
CORPORATE SOURCE: Armstrong Lab., Tyndall Air Force Base, FL, 32403-5323, USA
SOURCE: Journal of Bacteriology (1995), 177(13), 3837-42
CODEN: JOBAAY; ISSN: 0021-9193
PUBLISHER: American Society for Microbiology
DOCUMENT TYPE: Journal
LANGUAGE: English

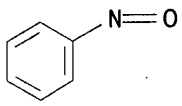
AB P. pseudoalcaligenes JS45 grows on nitrobenzene as a sole source of C, N, and energy. The catabolic pathway involves redn. to hydroxylaminobenzene followed by rearrangement to o-**aminophenol** and ring fission. Here, a nitrobenzene-inducible, O2-insensitive **nitroreductase** was purified from exts. of JS45 by (NH4)2SO4 pptn. followed by anion-exchange and gel filtration chromatog. A single 33-kDa polypeptide was detected by denaturing gel electrophoresis. The size of the native protein was estd. to be 30 kDa by gel filtration. The enzyme was a flavoprotein with a tightly bound FMN cofactor in a ratio of 2 mol of flavin per mol of protein. The Km for nitrobenzene was 5 .mu.M at an initial NADPH concn. of 0.5 mM. The Km for NADPH at an initial nitrobenzene concn. of 0.1 mM was 183 .mu.M. Nitrosobenzene was not detected as an intermediate of nitrobenzene redn., but nitrosobenzene was a substrate for the enzyme, and the specific activity for nitrosobenzene was higher than that for nitrobenzene. These results suggest that nitrosobenzene is formed but is immediately reduced to hydroxylaminobenzene. Hydroxylaminobenzene was the only product detected after incubation of the purified enzyme with nitrobenzene and NADPH. Hydroxylaminobenzene did not serve as a substrate for further redn. by this enzyme. The products and intermediates were consistent with 2 2-electron redns. of the parent compd. Furthermore, the low Km and the inducible control of enzyme synthesis suggested that nitrobenzene is the physiol. substrate for this enzyme.

IT **100-65-2**
RL: BSU (Biological study, unclassified); MFM (Metabolic formation); BIOL (Biological study); FORM (Formation, nonpreparative)
(products of nitrobenzene **nitroreductase** from Pseudomonas pseudoalcaligenes JS45)
RN 100-65-2 HCAPLUS
CN Benzenamine, N-hydroxy- (9CI) (CA INDEX NAME)

HO—NH—Ph

IT **9037-41-6P**, Nitrobenzene reductase
RL: PRP (Properties); PUR (Purification or recovery); PREP (Preparation)
(purifn. and characterization of nitrobenzene **nitroreductase** from Pseudomonas pseudoalcaligenes JS45)
RN 9037-41-6 HCAPLUS
CN Reductase, nitro- (9CI) (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***
IT **586-96-9**, Nitrosobenzene
RL: BPR (Biological process); BSU (Biological study, unclassified); BIOL (Biological study); PROC (Process)
(reactions of nitrobenzene **nitroreductase** from Pseudomonas pseudoalcaligenes JS45)
RN 586-96-9 HCAPLUS
CN Benzene, nitroso- (8CI, 9CI) (CA INDEX NAME)



CC 7-2 (Enzymes)
ST nitrobenzene reductase Pseudomonas
IT Pseudomonas pseudoalcaligenes
(JS45; purifn. and characterization of nitrobenzene **nitroreductase** from Pseudomonas pseudoalcaligenes JS45)
IT Michaelis constant
(of nitrobenzene **nitroreductase** from Pseudomonas pseudoalcaligenes)
IT **100-65-2**
RL: BSU (Biological study, unclassified); MFM (Metabolic formation); BIOL (Biological study); FORM (Formation, nonpreparative)
(products of nitrobenzene **nitroreductase** from Pseudomonas pseudoalcaligenes JS45)
IT **9037-41-6P**, Nitrobenzene reductase
RL: PRP (Properties); PUR (Purification or recovery); PREP (Preparation)
(purifn. and characterization of nitrobenzene **nitroreductase** from Pseudomonas pseudoalcaligenes JS45)
IT **586-96-9**, Nitrosobenzene
RL: BPR (Biological process); BSU (Biological study, unclassified); BIOL (Biological study); PROC (Process)
(reactions of nitrobenzene **nitroreductase** from Pseudomonas pseudoalcaligenes JS45)

Registry & HCA PLUS search

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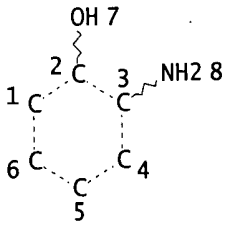
L14 STR



← search for product

NODE ATTRIBUTES:
DEFAULT MLEVEL IS ATOM
DEFAULT ECLEVEL IS LIMITED

GRAPH ATTRIBUTES:
RSPEC I
NUMBER OF NODES IS 8

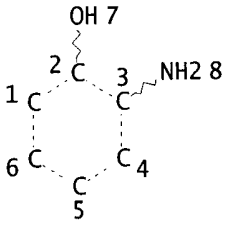
at least 1 ring
oxygen
nitrogen

STEREO ATTRIBUTES: NONE
L17 SCR 1838 AND 2004 AND 1992
L18 SCR 1841 OR 2043 no polymers, max of 3 rings
L28 SCR 1568 AND 1700 -OH & NH_2 groups
L30 3347 SEA FILE=REGISTRY SSS FUL L14 AND L17 AND L28 NOT L18
L32 1891 SEA FILE=HCAPLUS ABB=ON PLU=ON L30/PREP
L34 1 SEA FILE=HCAPLUS ABB=ON PLU=ON L32 AND MUTASE/OBI
L36 1 SEA FILE=HCAPLUS ABB=ON PLU=ON L32 AND NITROREDUCTASE/OBI
L37 1 SEA FILE=HCAPLUS ABB=ON PLU=ON L34 AND L36 1 cite

OBI = all search fields except the abstract

=> D QUE L48
L14 STR

same STR search as above



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GRAPH ATTRIBUTES:
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NUMBER OF NODES IS 8

STEREO ATTRIBUTES: NONE
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L18 SCR 1841 OR 2043
L28 SCR 1568 AND 1700
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L32 1891 SEA FILE=HCAPLUS ABB=ON PLU=ON L30/PREP
L41 391116 SEA FILE=REGISTRY ABB=ON PLU=ON 46.150.18/RID AND NR<3 AND "NITRO" (0)
L42 122706 SEA FILE=REGISTRY ABB=ON PLU=ON L41 AND NR=1

search for reactant NO_2 (0)

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L44      310391 SEA FILE=HCAPLUS ABB=ON   PLU=ON  L42
L45      142026 SEA FILE=HCAPLUS ABB=ON   PLU=ON  L43
L46      122935 SEA FILE=HCAPLUS ABB=ON   PLU=ON  (L44 OR L45)(L)(RCT OR
                RACT)/RL
L47        1151 SEA FILE=HCAPLUS ABB=ON   PLU=ON  L46 AND L32
L48           1 SEA FILE=HCAPLUS ABB=ON   PLU=ON  L47 AND NITROREDUCTASE
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had to break up L41 to cross over the large answer set

≈ reactant → product

1 cite

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L14             STR
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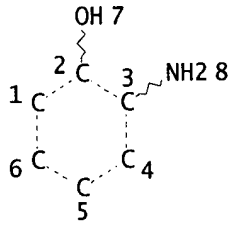
same search as for L48 query display

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NODE ATTRIBUTES:
DEFAULT MLEVEL IS ATOM
DEFAULT ECLEVEL IS LIMITED

GRAPH ATTRIBUTES:
RSPEC I
NUMBER OF NODES IS   8

STEREO ATTRIBUTES: NONE
L17             SCR 1838 AND 2004 AND 1992
L18             SCR 1841 OR 2043
L28             SCR 1568 AND 1700
L30        3347 SEA FILE=REGISTRY SSS FUL L14 AND L17 AND L28 NOT L18
L32        1891 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L30/PREP
L41      391116 SEA FILE=REGISTRY ABB=ON  PLU=ON  46.150.18/RID AND NR<3 AND
                "NITRO"
L42      122706 SEA FILE=REGISTRY ABB=ON  PLU=ON  L41 AND NR=1
L43      268410 SEA FILE=REGISTRY ABB=ON  PLU=ON  L41 NOT L42
L44      310391 SEA FILE=HCAPLUS ABB=ON   PLU=ON  L42
L45      142026 SEA FILE=HCAPLUS ABB=ON   PLU=ON  L43
L46      122935 SEA FILE=HCAPLUS ABB=ON   PLU=ON  (L44 OR L45)(L)(RCT OR
                RACT)/RL
L52         381 SEA FILE=HCAPLUS ABB=ON   PLU=ON  L46 AND (PSEUDOMONAS OR
                ?ALCALIG?)
L53           3 SEA FILE=HCAPLUS ABB=ON   PLU=ON  L52 AND L32
```

using bug instead of enzyme

3 cites

```
=> S L37 OR L48 OR L53
L54           3 L37 OR L48 OR L53
```

combining queries

```
=> d ibib abs hitstr L54 1

L54  ANSWER 1 OF 3  HCAPLUS  COPYRIGHT 2003 ACS
ACCESSION NUMBER:        2000:349018  HCAPLUS
DOCUMENT NUMBER:         133:88272
TITLE:                   Production of 2-amino-5-phenoxyphenol from
                         4-nitrobiphenyl ether using nitrobenzene
                         nitroreductase and hydroxylaminobenzene
                         mutase from Pseudomonas
```

applicant

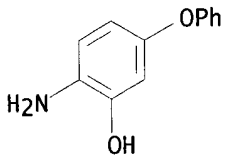
pseudoalcaligenes JS45

AUTHOR(S): Nadeau, L. J.; He, Z.; Spain, J. C.
CORPORATE SOURCE: Air Force Research Laboratory/MLQ, Tyndall Air Force Base, FL, 32403, USA

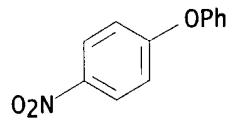
SOURCE: Journal of Industrial Microbiology & Biotechnology (2000), 24(4), 301-305
CODEN: JIMBFL; ISSN: 1367-5435
PUBLISHER: Nature Publishing Group
DOCUMENT TYPE: Journal
LANGUAGE: English

AB Microbial metab. of nitroarenes via o-aminophenols requires the participation of two key enzymes, a **nitroreductase** and an hydroxylaminobenzene mutase. The broad substrate ranges of the enzymes suggested that they could be used as biocatalysts for the prodn. of substituted o-aminophenols. Enzymes from **Pseudomonas pseudoalcaligenes** JS45 were used for the conversion of 4-nitrobiphenyl ether to the corresponding o-aminophenol. Partially purified nitrobenzene **nitroreductase** reduced 4-nitrobiphenyl ether to the corresponding 4-hydroxylaminobiphenyl ether. Partially purified hydroxylaminobenzene mutase stoichiometrically converted the intermediate to 2-amino-5-phenoxyphenol. The results indicate that the enzyme system can be applied for the prodn. of o-aminophenols useful as intermediates for synthesis of com. important materials.

IT **42944-32-1P**
RL: BMF (Bioindustrial manufacture); BPN (Biosynthetic preparation); BIOL (Biological study); **PREP (Preparation)**
(2-amino-5-phenoxyphenol prodn. from 4-nitrobiphenyl ether using nitrobenzene **nitroreductase** and hydroxylaminobenzene **mutase** from **Pseudomonas pseudoalcaligenes**)
RN 42944-32-1 HCAPLUS
CN Phenol, 2-amino-5-phenoxy- (9CI) (CA INDEX NAME)



IT **620-88-2**, 4-Phenoxynitrobenzene
RL: BPR (Biological process); BSU (Biological study, unclassified); **RCT (Reactant)**; BIOL (Biological study); PROC (Process); **RACT (Reactant or reagent)**
(2-amino-5-phenoxyphenol prodn. from 4-nitrobiphenyl ether using nitrobenzene **nitroreductase** and hydroxylaminobenzene **mutase** from **Pseudomonas pseudoalcaligenes**)
RN 620-88-2 HCAPLUS
CN Benzene, 1-nitro-4-phenoxy- (9CI) (CA INDEX NAME)



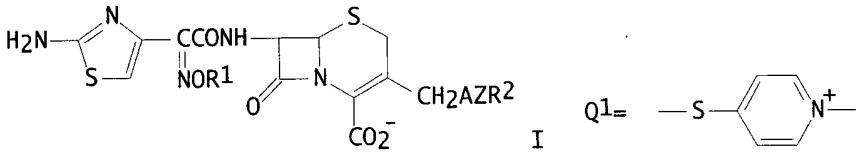
REFERENCE COUNT: 34 THERE ARE 34 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

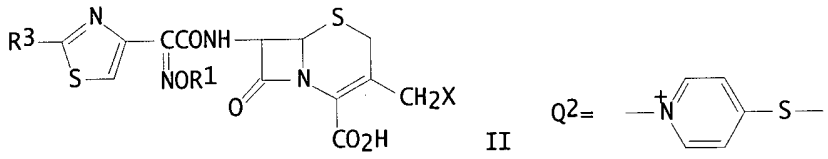
=> d ibib abs 2

L54 ANSWER 2 OF 3 HCAPLUS COPYRIGHT 2003 ACS
ACCESSION NUMBER: 1990:552136 HCAPLUS
DOCUMENT NUMBER: 113:152136
TITLE: Pyridiniothiomethylcephems as antibacterial agents and their preparation
INVENTOR(S): Azuma, Kokichi; Nakai, Hideo; Yamaguchi, Totaro
PATENT ASSIGNEE(S): Tanabe Seiyaku Co., Ltd., Japan
SOURCE: Jpn. Kokai Tokkyo Koho, 19 pp.
CODEN: JKXXAF
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 02028185	A2	19900130	JP 1989-60689	19890315

PRIORITY APPLN. INFO.: JP 1988-92583 19880414
OTHER SOURCE(S): MARPAT 113:152136
GI





AB The title compds. I [R1 = H, (carboxy)alkyl, oxopyrrolidyl; R2 = (substituted) Ph; A = Q1, Q2, which may have up to 2 CO2H substituents; Z = bond, CH2, (CH2)2, CH(CO2H)CH2] and pharmaceutically acceptable salts thereof were by reaction of cephem II [R3 = (protected) amino, X = reactive residue; R1 = as above] with either pyridine or thiopyridone derivs. A mixt. of 1-(3,4-dihydroxyphenyl)-4-thiopyridone and 7.beta.-[2-(2-aminothiazol-4-yl)-2-(Z)-(2-carboxyprop-2-oxyimino)acetamido]cephalosporanic acid di-Na salt in MeCN contg. NaI was stirred at 65-70.degree. for 7 h to give, after workup, (7.beta.,Z)-I [R1 = C(CO2Na)Me2, A = Q1, R2 = 3,4-dihydroxyphenyl, Z = bond] (III). III had MIC values of 0.05 .mu.g/mL or less against **Pseudomonas** aeruginosa PI-67 and Escherichia coli ML-1410.RGN-823. ← false drop

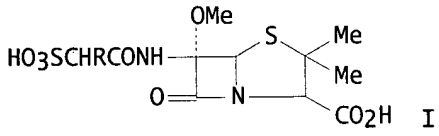
=> d ibib abs 3

L54 ANSWER 3 OF 3 HCAPLUS COPYRIGHT 2003 ACS
ACCESSION NUMBER: 1984:68081 HCAPLUS
DOCUMENT NUMBER: 100:68081

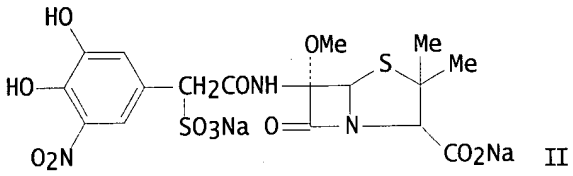
TITLE: .beta.-Lactam derivatives
INVENTOR(S): Burton, George; Lashford, Andrew Gerard
PATENT ASSIGNEE(S): Beecham Group PLC, UK
SOURCE: Eur. Pat. Appl., 46 pp.
CODEN: EPXXDW
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 91302	A1	19831012	EP 1983-301876	19830331
R: BE, CH, DE, FR, GB, IT, LI, NL, SE				
ES 521195	A1	19840601	ES 1983-521195	19830330
AU 8313088	A1	19831006	AU 1983-13088	19830331
ZA 8302360	A	19840328	ZA 1983-2360	19830331
JP 58185592	A2	19831029	JP 1983-59133	19830404
ES 527806	A1	19850801	ES 1983-527806	19831205

PRIORITY APPLN. INFO.: GB 1982-9982 19820403
GI



I



II

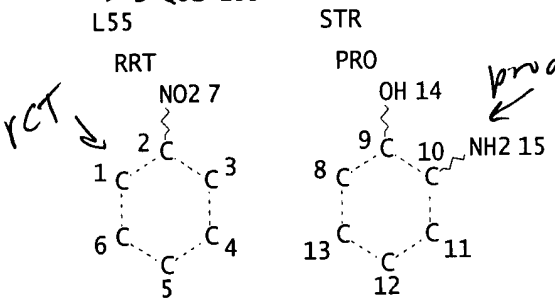
AB Penicillins I (R = substituted dihydroxyphenyl) were prepd. Thus, 5,3,4-O2N(AcO)2C6H2CH(SO3H)COCl was prepd. from homovanillic acid in 6 steps and was used to acylate benzyl 6.alpha.-methoxy-6.beta.-aminopenicillanate. Hydrolysis of the product in 2 steps gave the phenylacetamide II which had a min. inhibitory conc. against **Pseudomonas** aeruginosa 10662 of 5 .mu.g/mL.

false drop

Casreact search

MARX 10/076,383

=> D QUE L59
L55 STR

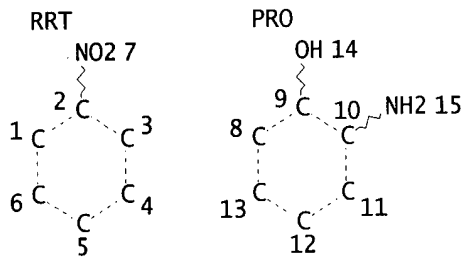


NODE ATTRIBUTES:
DEFAULT MLEVEL IS ATOM
DEFAULT ECLEVEL IS LIMITED

GRAPH ATTRIBUTES:
RING(S) ARE ISOLATED OR EMBEDDED
NUMBER OF NODES IS 15

STEREO ATTRIBUTES: NONE
L57 248 SEA FILE=CASREACT SSS FUL L55 (640 REACTIONS) 248 cites
L59 4 SEA FILE=CASREACT ABB=ON PLU=ON L57 AND (ENZYM? OR MUTASE OR NITROREDUCTASE) 4 cites

=> D QUE L60
L55 STR Same sth search as above



NODE ATTRIBUTES:
DEFAULT MLEVEL IS ATOM
DEFAULT ECLEVEL IS LIMITED

GRAPH ATTRIBUTES:
RING(S) ARE ISOLATED OR EMBEDDED
NUMBER OF NODES IS 15

STEREO ATTRIBUTES: NONE
L57 248 SEA FILE=CASREACT SSS FUL L55 (640 REACTIONS)
L60 0 SEA FILE=CASREACT ABB=ON PLU=ON L57 AND (PSEUDOMONAS OR ?ALCALIG?) no cites ← using bug

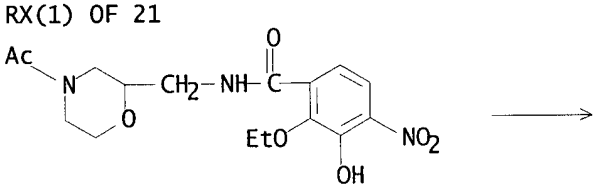
none of these are very good

=> D IBIB ABS FCRDREF L59 1

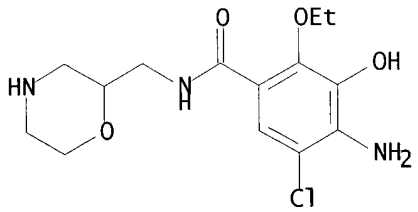
L59 ANSWER 1 OF 4 CASREACT COPYRIGHT 2003 ACS
ACCESSION NUMBER: 125:238288 CASREACT
TITLE: Synthesis and biological activity of 4-amino-5-chloro-2-ethoxy-3-hydroxybenzamides, metabolites of a new gastroprokinetic agent, mosapride
AUTHOR(S): Kato, Shiro; Morie, Toshiya; Yoshida, Naoyuki
CORPORATE SOURCE: Discovery Res. Lab., Dainippon Pharmaceutical Co., Ltd., Suita, 564, Japan
SOURCE: Chemical & Pharmaceutical Bulletin (1996), 44(8), 1484-1492
CODEN: CPBTAL; ISSN: 0009-2363
PUBLISHER: Pharmaceutical Society of Japan
DOCUMENT TYPE: Journal
LANGUAGE: English

AB To confirm the proposed structures of the minor metabolites of a potential gastroprokinetic agent, mosapride, 4-amino-5-chloro-2-ethoxy-3-hydroxy-N-(2-morpholinylmethyl)benzamide and the N-(5-oxo-2-morpholinyl)methyl analog were prepd. As the common intermediate, 2-ethoxy-3-hydroxy-4-nitrobenzoic acid was prepd. via the regioselective ethylation of 2,3-dihydroxybenzaldehyde (10) and subsequent nitration of the resultant 2-ethoxy-3-hydroxybenzaldehyde. After **enzymic** treatment of the isolated metabolites, their structures were identified by comparison with the synthetic compds. Serotonin-4 receptor binding affinity of these metabolites was lower than that of mosapride.

RX(1) OF 21



(step 1)



REF: Chemical & Pharmaceutical Bulletin, 44(8), 1484-1492; 1996
NOTE: 3 STEPS

=> D IBIB ABS FCRDREF L59 2

L59 ANSWER 2 OF 4 CASREACT COPYRIGHT 2003 ACS
ACCESSION NUMBER: 111:129562 CASREACT
TITLE: Quantitative structure-activity relationships in

dihydropteroate synthase inhibition by multisubstituted sulfones. Design and synthesis of some new derivatives with improved potency

AUTHOR(S): De Benedetti, Pier G.; Iarossi, Dario; Folli, Ugo; Frassineti, Chiara; Menziani, Maria Cristina; Cennamo, Carlo

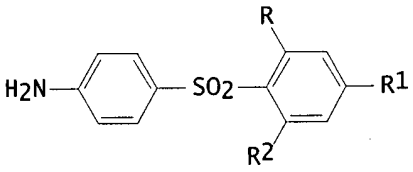
CORPORATE SOURCE: Ist. Chim. Biol., Univ. Modena, Modena, 41100, Italy

SOURCE: Journal of Medicinal Chemistry (1989), 32(10), 2396-9
CODEN: JMCMAR; ISSN: 0022-2623

DOCUMENT TYPE: Journal

LANGUAGE: English

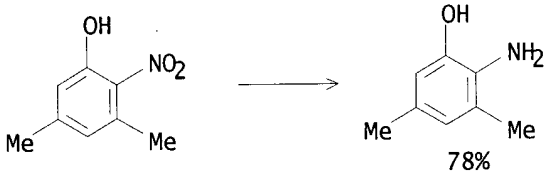
GI



I

AB On the basis of the linear correlation existing for a set of homomultisubstituted 4-aminodiphenyl sulfones (I, R = Me or Cl, R1 = OH, O-, OMe, or Me, R2 = H, OH, O-, or OMe) between the computed (INDO) electronic net charges of the SO2 group and the **enzymic** inhibition data on dihydropteroate synthase from Escherichia coli, 7 new heteromultisubstituted derivs. were designed, synthesized, and tested for their inhibition potencies. These compds. were found to be 5-11-fold more effective than 4,4'-diaminodiphenyl sulfone. The implications of the results in the drug design and in the model for the **enzyme** -inhibitors interaction are discussed.

RX(2) OF 50



REF: Journal of Medicinal Chemistry, 32(10), 2396-9; 1989

=> D IBIB ABS FCRDREF L59 3

L59 ANSWER 3 OF 4 CASREACT COPYRIGHT 2003 ACS

ACCESSION NUMBER: 109:129502 CASREACT

TITLE: Studies on steroids. CCXXXVI. New synthesis of 2-hydroxyestrogen 2-monoglucuronides

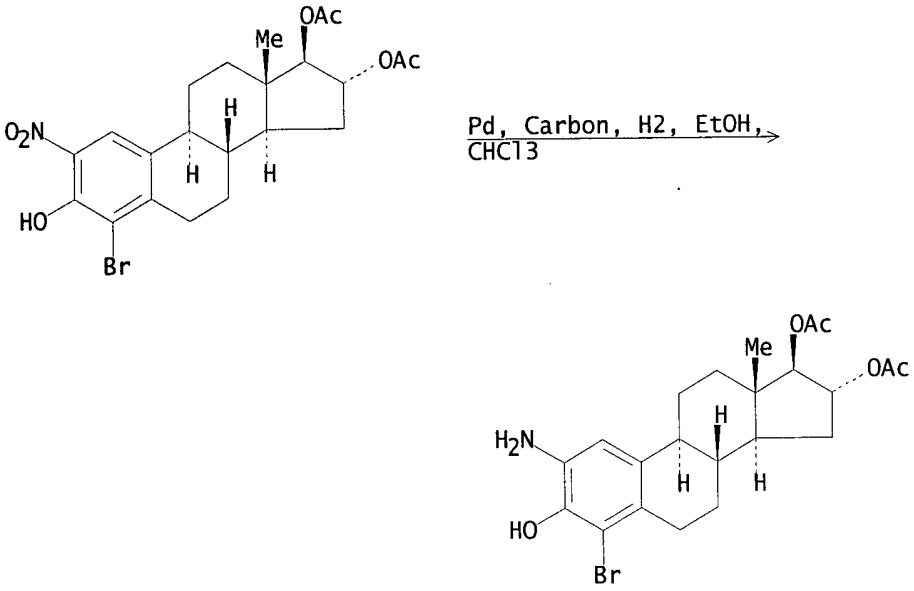
AUTHOR(S): Okubo, Tadashi; Tsuchiko, Fumiko; Nambara, Toshio

CORPORATE SOURCE: Pharm. Inst., Tohoku Univ., Sendai, 980, Japan

SOURCE: Chemical & Pharmaceutical Bulletin (1988), 36(1), 419-23
CODEN: CPBTAL; ISSN: 0009-2363

DOCUMENT TYPE: Journal
LANGUAGE: English
AB New synthetic routes leading to catechol estrogen 2-monoglucuronides are described. Thus, 4-bromo-2-hydroxyestriol 16,17-diacetate via Koenigs-Knorr reaction with Me .alpha.-acetobromoglucuronate in the presence of CdCO3 proceeded preferentially toward the C-2 hydroxyl group. Subsequent reductive dehalogenation followed by alk. hydrolysis gave the desired 2-hydroxyestriol 2-glucuronide. Similarly, 2-hydroxyestradiol and 2-hydroxyestrone 2-glucuronides were prepd.

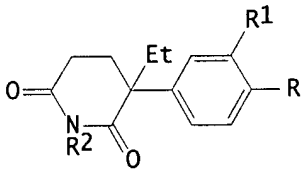
RX(3) OF 88



REF: Chemical & Pharmaceutical Bulletin, 36(1), 419-23; 1988

=> D IBIB ABS FCRDREF L59 4

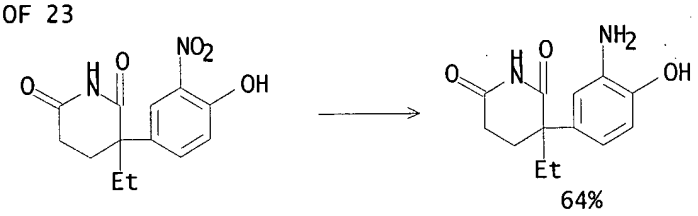
L59 ANSWER 4 OF 4 CASREACT COPYRIGHT 2003 ACS
ACCESSION NUMBER: 98:11108 CASREACT
TITLE: Analogs of aminoglutethimide: selective inhibition of cholesterol side-chain cleavage
AUTHOR(S): Foster, Allan B.; Jarman, Michael; Leung, Chui Sheung; Rowlands, Martin G.; Taylor, Grahame N.
CORPORATE SOURCE: Drug Metab. Group, Inst. Cancer Res., Sutton/Surrey, SM2 5PX, UK
SOURCE: Journal of Medicinal Chemistry (1983), 26(1), 50-4
CODEN: JMCMAR; ISSN: 0022-2623
DOCUMENT TYPE: Journal
LANGUAGE: English
GI



I, $R=NH_2$, $R^1=R^2=H$
II, $R=R^1=H$, $R^2=NH_2$
III, $R=R^2=H$, $R^1=NH_2$

AB aminoglutethimide (I) [125-84-8] and 13 of its analogs, some of which were synthesized, were tested for aromatase [9039-48-9]- and steroid 20-22-desmolase [37292-81-2]-inhibiting activity. N-aminoglutethimide (II) [4238-75-9] selectively inhibited desmolase and was more inhibitory than I; m-aminoglutethimide (III) [83417-11-2] also selectively inhibited desmolase, but was equal to I in inhibitory activity. Structure-activity relations are discussed.

RX(12) OF 23



REF: Journal of Medicinal Chemistry, 26(1), 50-4; 1983